

# PATENT SPECIFICATION

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## (54) MEASUREMENT OF A PERSON AND ARTICLES PRODUCED FROM SUCH MEASUREMENT

(71) We, JACKNY MEASURING METHOD LIMITED, a British Company, c/o Roland Hollick & Co, 6 Queen Victoria Road, Coventry CV1 3JE, JACK NEATH, a British subject, of 94 Mercia House, Lower Precinct, Coventry, CV1 1AR, and REPINA SIRCH, a Citizen of the Federal Republic of Germany, of 94 Mercia House, Lower Precinct, Coventry CV1 1NR, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

15 The invention relates to the measurement of a person and articles produced from such measurement. The invention is particularly but not exclusively applicable to methods of measuring a person for the purpose of producing an item of clothing of a shape to fit that person.

20 In conventional bespoke tailoring, the shape and size of each piece from which a particular article of clothing is to be made up is determined by measuring various dimensions directly on the particular person for whom the item is being made. The measurements so taken are then transferred to the cloth by a cutter, who then cuts out the various pieces. This process is subject to error due to the different allowances made by the measurer and cutter, and in particular because it is extremely difficult to determine accurately the slope of the shoulders of the person, and the relation of the neck to the shoulder and arm seams of the item of clothing.

35 The conventional method of measuring referred to is inherently incapable of accurately determining the shape of the person's body since dimensions measured directly from the body do not determine accurately the shape of the body. This is because, between certain limits, there may be an infinite number of variations of

shape consistent with any particular set of dimensions obtained in this way. The apparatus to be described in the present specification, which embodies the invention, seeks to overcome this difficulty by measuring dimensions from a fixed datum rather than dimensions directly on the body, since dimensions measured from a fixed datum can define the shape of the body.

50 The invention provides a method of measuring a person, comprising the steps of locating the person adjacent a vertically adjustable reference structure which forms a part of apparatus having means capable of measuring the spatial relationships between selected points on the body of the person and a reference part mounted at a fixed height on the reference structure irrespective of the height of the person being measured, which reference part defines a datum point on the reference structure above floor level, engaging the reference part with a preselected point on the body of the person, employing the measuring means to measure said spatial relationships between further selected points on the body of the person and the datum point on the reference structure, and indicating and/or recording the measurements obtained.

55 Preferably the method includes the step of adjusting the height of the reference structure relative to the person located adjacent thereto without affecting the spatial relationships of the measuring means relative to the reference part.

60 The invention also provides apparatus for measuring a person comprising a vertically adjustable reference structure adjacent which a person may be located, a reference part mounted at a fixed height on the reference structure for engagement with a pre-selected point on the body of the person irrespective of the height of the

person to be measured, which reference part defines a datum point on the reference structure above floor level, means for measuring the spatial relationships between  
5 further selected points on the body of the person and the datum point, and means for indicating and/or recording the measurements obtained.

10 In one embodiment of the invention the reference structure is attached to a stand and is movable vertically relative to the stand, said movement adjusting the height of the reference part above floor level without altering the spatial relationships of  
15 the measuring means relative to the reference part. The reference part may be an element movable towards and away from the reference structure for engagement with the neck of the person to be measured.

20 Each said measuring means may be an element mounted on the reference structure for movement relative thereto to engage the respective further selected point on the body of the person to be measured. At  
25 least some of said elements may be mounted for movement in three directions relative to the reference structure, said directions being at right angles to each other and being parallel or normal to the  
30 reference structure. Also each said element may be a mechanical probe connected to an electrical transducer.

Preferably the means for indicating and/or recording the measurements obtained  
35 comprises an electronic data logger.

It is also preferred that means are provided for both indicating and recording the measurements in digital form.

40 The invention further provides a method of measuring a person employing apparatus described above.

The invention also provides a method of producing at least one pattern piece for the production of an article therefrom,  
45 comprising measuring a person by a method or apparatus described above, comparing the measurements so obtained with corresponding standard measurements, and using the information obtained  
50 from the comparison to produce at least one pattern piece from which the article may be made.

The pattern piece or pieces so produced may then be used to produce an article.

55 The invention further provides a method of producing an article comprising measuring a person by a method or apparatus described above, selecting one or more standard pattern pieces, and producing an article  
60 therefrom whilst employing the measurements obtained during the measuring steps to indicate deviations to be made from the standard pattern piece or pieces in order that the article produced conforms  
65 with the shape of the person measured.

The article is preferably an article of clothing.

The invention still further provides one or more pattern pieces or an article produced by a method described above. 70

The following is a description of examples of apparatus constructed in accordance with the invention and for putting a method embodying the invention into effect, reference being made to the accompanying drawings in which:— 75

Figure 1 is a perspective view of one apparatus; and

Figure 2 shows the display panel of the indicating and recording means of the apparatus of Figure 1. 80

Referring to the drawings, there is shown a measuring apparatus enclosed in a suitable casing in combination with electronic equipment for processing the electrical "deviation" signals into a digital readout, indicated generally at 51, and a continuous printout sheet 67. The printout is then read by the cutter, and the information it contains is used to modify the "standard" pattern. 85 90

Alternatively, the electrical analogues could be processed to punch a card template directly, the template then being taken by the cutter and used as his template to mark the cloth. 95

The measuring apparatus, provides tapes 49 47 and 48 to measure chest, waist and hip circumference respectively. Each tape, or in the case of the tape 48 each half-tape, when pulled out from the vertical centreline of the apparatus, operates its own mechano-electrical transducer (in this apparatus, a rotary potentiometer) to measure the quantity being determined, and each tape is movable vertically up and down in a slot 52 in the front panel 54 of the apparatus casing 53. Folding shutter screens, such as are indicated at 55, are fitted as shown to certain of the vertically and horizontally movable elements to present a neat appearance and to prevent dust from entering the inside of the casing 53, and the entire apparatus can be raised and lowered relative to its base by turning a handwheel 56. This wheel 56, mounted on one side panel of the casing 53, drives a pinion-and-rack to raise or lower the casing, relative to a base or stand 10. 105 110 115

The movements of the various measuring elements are as follows: A neck pad 34 can move towards and away from the panel 54. Collar plates 38 can move laterally, vertically, and "in and out" (that is, towards and away from the panel 54). Rods 41 attached thereto are telescopic and have pads 57 for resting on top of a person's shoulders. The rods are guided in plates 43 which can also move in all three directions and locate the width of shoulder. 120 125 130

Extensible Bowden (Registered Trade Mark) cables, shown in broken line in Figure 1, run between the plates 38 and underarm locating plates 24 to measure the 5 forward and downward slope of each shoulder (i.e. the front balance) via rotary potentiometers inside the casing 53. Similarly, a flexible and extensible cable 58 runs from the neck pad 34 to a slide block 10 for the tape 49 to give the degree of roundness of the upper back (i.e. the back balance) by operating a potentiometer.

The underarm locating plates 24 can move in all three directions, and so can 15 elbow-height locating plates 11. At its outer end each of these plates 21 carries an extensible Bowden cable 59, leading back to a potentiometer inside the casing 53. These cables can, by measuring the 20 distance from the elbow to the cuff, measure an effective sleeve length. Between the slide blocks for the tapes 47 and 48 there is a flexible and extensible cable 61, which determines the curve of the small of the 25 back. The varying horizontal distances from the front panel 54 of successive points along the length of this cable 61 are measured by rotary potentiometers linked to the cable, and thereby the degree of 30 curvature of the small of the back is measured.

A fork locating arm 28 is movable vertically in the slot 52, and can be swung flat against the panel 54 by a lever arm 62 35 when not in use. Finally, a slide block 63 is movable vertically up and down against a scale 64 to indicate the desired length of jacket.

It will be appreciated that, for all the 40 movements possible with these parts, the neck pad 34 constitutes a datum point and the front panel 54 a datum plane. In addition, a Bowden cable measurer shown generally at 65 is provided on one side 45 panel of the casing 53, and this operates without reference to any datum other than its own unextended length. The measurer 65 can therefore be used as an ordinary tape measure—for instance, for lapel and 50 trouser widths — and its successive measurements are indicated and recorded by extending the cable over desired lengths to be measured, and for each extension pressing a "repeater" foot button 66 set 55 into the base 10 of the apparatus. The extending cable operates a rotary potentiometer inside the apparatus, and each such electrical analogue measurement is indicated digitally on the display panel of an 60 electronic data logger and recorded on the continuous printout sheet 67. The logger 51 is shown purely diagrammatically in Figure 1 and its display panel will now be described with reference to Figure 2. A brief 65 description of the operation of the ap-

paratus will also be given.

In use, a person to be measured stands on the base 10 with his back to the panel 54. The wheel 56 is rotated to bring the casing 53 to an appropriate height de- 70 termined by the neck pad 34 which is then adjusted in and out relative to the panel 54 to locate a first datum point. The remaining movable elements are then 75 brought into position from their zero (minimum size setting) positions, and the first of three sets of measurements is carried out by pressing the "auto" button, setting cer- 80 tain of the movable elements to perform a measuring sequence and pressing the "sequence 1" button. The measurements are thus automatically all recorded in- 85 dicated in digital form on the "7-8-9" indicator and printed one below another on a printout sheet 67. The settings and 85 measurements for the second and third sequences with the remaining movable elements are obtained and recorded in a similar way using the second and third 90 "sequence" buttons in succession.

If a data logger with sufficient input channels is used, all the measurements can of course be obtained, indicated and re- 95 corded in a single sequence.

The "tape" button is then pressed, and 95 the cable measurer 65 used to take, say, lapel width measurements. As described previously, the repeater foot button 66 is used to record successive extended lengths 100 of the cable, and when the button 66 is pressed the particular measurement is indicated at "7-8-9" and printed at 67 and is then stored by the logger, irrespective of what then happens to the cable length, 105 until the button 66 is pressed again.

Finally, the "manual" button is pressed and a series of three-digit codes — for ex- 110 ample, styling codes — is dialled on the "4-5-6" indicator. Pressing the "print" button after each dialling transfers the dialled 110 code onto the continuous printout sheet 67.

The printout sheet, with all relevant in- 115 formation thus obtained, can then be compared with a sheet of predetermined "standard" information, obtained for instance from a standard suit sizing pattern, and a 115 suit selected to fit approximately the person being measured.

Alternatively, the measurements given on 120 the printout sheet may, after suitable processing, be given to a cutter who uses them to produce one or more pattern pieces for the person who has been 125 measured. The pieces of cloth from which the article is to be made may then be cut-out using the pattern piece or pieces. In multiple tailoring systems however the normal procedure is for the cloth to be cut 130 from a basic, already existing standard pattern. The standard pattern to be used is

normally selected according to a few basic measurements, such as chest and waist size. The measurements obtained from the apparatus may, in this case, be used to indicate deviations to be made from the basic pattern in order that the finished garment should conform with the shape of the person measured. In this case the various adjustable parts of the apparatus may each have a zero setting corresponding to the dimensions of the basic pattern and the measurements taken from the apparatus may then simply give the magnitudes of the deviations from the basic pattern. Any convenient unit may be used for the deviations but it is found that three basic sizes of unit may conveniently be used for measuring the deviations on various parts of the body since in some places smaller deviations are more critical and smaller units must therefore be used than in other places. It is found that a smallest unit of the order of one eighth of an inch is convenient together with an intermediate unit of twice the value and a largest unit of four times this value (i.e. of the order of half an inch). These units may be conveniently referred to as milos, celos, and delos respectively.

In different multiple tailoring systems the precise dimensions of the basic patterns selected from the basic measurements of a particular person may differ and this will have to be taken into account when initially setting up the apparatus and interpreting the measurements obtained. For example different basic patterns may assume a slightly different standard distance between the back of the neck and the junction between the shoulder and the side of the neck.

It will be appreciated that all the necessary allowances for a good "fit" of a jacket or other piece of clothing may be incorporated in the "standard" pattern; use of the above apparatus avoids the necessity of a measurer having to make allowances when measuring, for example, chest circumference. In addition, the apparatus accurately determines the slope of the shoulders, and the relationship between neck size and position and the sleeve position. These dimensions are very difficult to determine by conventional measuring techniques.

As mentioned earlier, the invention is not restricted to methods of measuring a person for tailoring purposes. It could for example be used to "size" deformed or disabled people in order to select the best fit of chair or back support from a number currently available.

Alternatively the invention could be used to determine the size and shape of articles, such as chairs or supports which it is re-

quired to manufacture to fit deformed or disabled people.

Furthermore, the measuring apparatus may be modified so that it only indicates or only records the spatial relationships measured. In the first case, the provision of a print out would be omitted, and in the second case the visual indicator "7-8-9" would be omitted. Also, the print out onto a continuous sheet may be replaced by a system of punched cards whereby the recording is effected by the holes punched in a card instead of being in digital form.

Still further means, such as a mechanical or electrical counter, may be provided for counting the number of measurements made and/or indicating the number in digital form.

#### WHAT WE CLAIM IS:

1. A method of measuring a person comprising the steps of locating a person adjacent a vertically adjustable reference structure which forms a part of apparatus having means capable of measuring the spatial relationships between selected points on the body of the person and a reference part mounted at a fixed height on the reference structure irrespective of the height of the person being measured, which reference part defines a datum point on the reference structure above floor level, engaging the reference part with a preselected point on the body of the person, employing the measuring means to measure said spatial relationships between further selected points on the body of the person and the datum point on the reference structure, and indicating and/or recording the measurements obtained.

2. A method as claimed in claim 1, including the step of adjusting the height of the reference structure relative to the person located adjacent thereto without affecting the spatial relationships of the measuring means relative to the reference part.

3. Apparatus for measuring a person comprising a vertically adjustable reference structure adjacent which a person may be located, a reference part mounted at a fixed height on the reference structure for engagement with a preselected point on the body of the person irrespective of the height of the person to be measured, which reference part defines a datum point on the reference structure above floor level, means for measuring the spatial relationships between further selected points on the body of the person and the datum point, and means for indicating and/or recording the measurements obtained.

4. Apparatus as claimed in claim 3, wherein the reference structure is attached to a stand and is movable vertically rela-

tive to the stand, said movement adjusting the height of the reference part above floor level without altering the spatial relationships of the measuring means relative to the reference part.

5 Apparatus as claimed in claim 4, wherein the reference part is an element movable towards and away from the reference structure for engagement with the neck of the person to be measured.

10 6. Apparatus as claimed in any one of claims 3 to 5, wherein each said measuring means is an element mounted on the reference structure for movement relative thereto to engage the respective further selected point on the body of the person to be measured.

7. Apparatus as claimed in claim 6, wherein at least some of said elements are mounted for movement in three directions relative to the reference structure, said directions being at right angles to each other and being parallel or normal to the reference structure.

25 8. Apparatus as claimed in claim 6 or claim 7, wherein each said element is a mechanical probe connected to an electrical transducer.

30 9. Apparatus as claimed in any one of claims 3 to 8, wherein the means for indicating and/or recording the measurements obtained comprises an electronic data logger.

35 10. Apparatus as claimed in any one of claims 3 to 9, including means for both indicating and recording the measurements in digital form.

40 11. A method of measuring a person employing apparatus as claimed in any one of claims 3 to 9.

12. A method of measuring a person substantially as hereinbefore described with reference to the accompanying drawings.

13. Apparatus for measuring a person

substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

14. A method of producing at least one pattern piece for the production of an article therefrom, comprising measuring a person by a method as claimed in any one of claims 1, 2, 11 or 12 or apparatus as claimed in any one of claims 3 to 10 or claim 13, comparing the measurements so obtained with corresponding standard measurements, and using the information obtained from the comparison to produce at least one pattern piece from which the article may be made.

15. A method of producing an article comprising producing one or more pattern pieces by a method as claimed in claim 14, and then producing an article from the pattern piece or pieces.

16. A method of producing an article comprising measuring a person by a method as claimed in any one of claims 1, 2, 11 or 12 or apparatus as claimed in any one of claims 3 to 10 or claim 13, selecting one or more standard pattern pieces, and producing an article therefrom whilst employing the measurements obtained during the measuring steps to indicate deviations to be made from the standard pattern piece or pieces in order that the article produced conforms with the shape of the person measured.

17. A method as claimed in any one of claims 14 to 16 wherein the article is an article of clothing.

18. A pattern piece produced by a method as claimed in claim 14.

19. An article produced by a method according to any one of claims 15 to 17.

BOULT, WADE & TENNANT

Chartered Patent Agents

34 Cursitor Street.

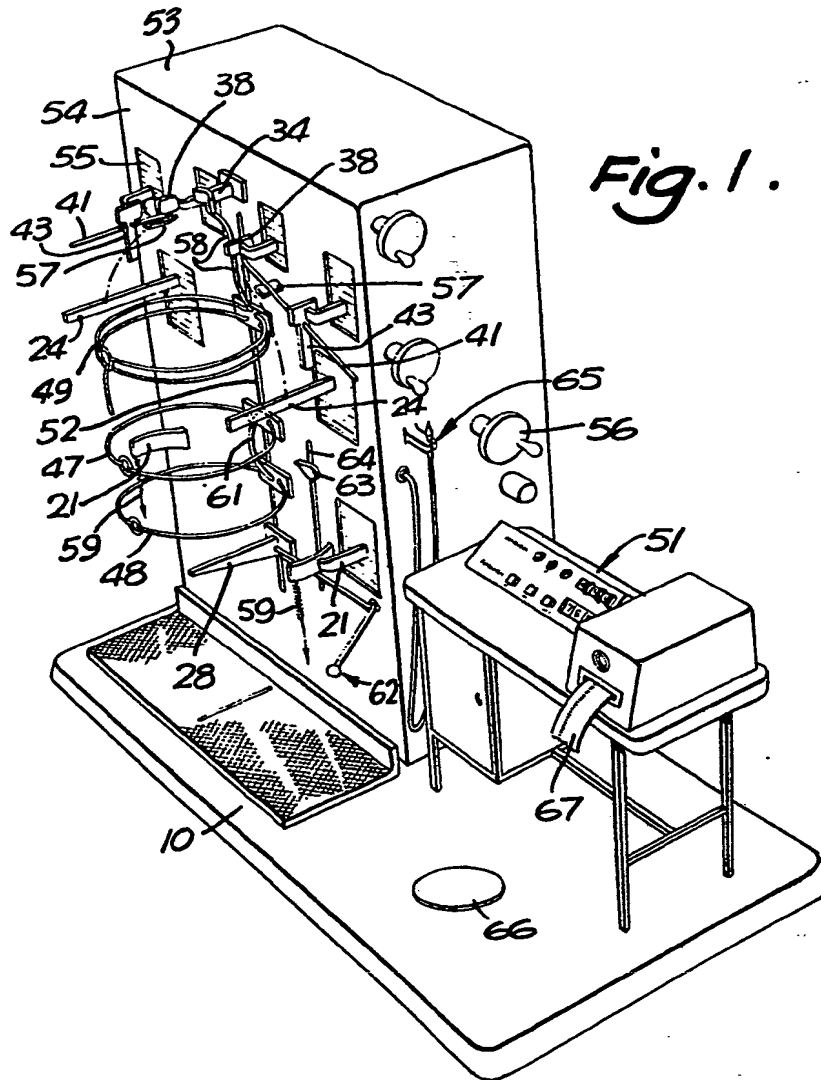
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COMPLETE SPECIFICATION

2 SHEETS

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SHEET 1



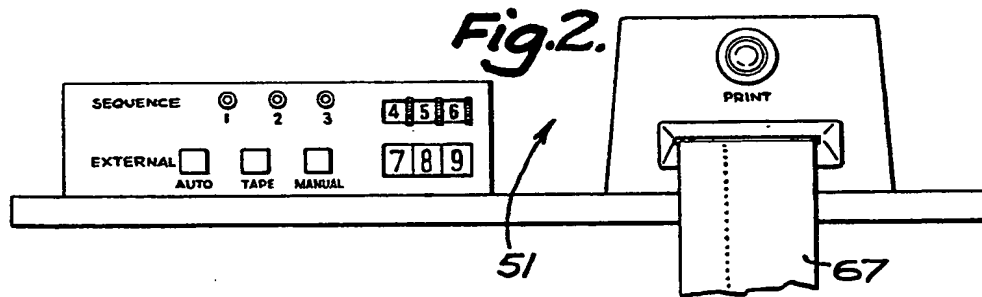
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COMPLETE SPECIFICATION

2 SHEETS

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SHEET 2



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